

PhD POSITION

NEURENGAGE: NEURofeedback and ENAGEment

SUPERVISION AND LABORATORIES

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Graduate School: ED 463 Human Movement Sciences, <http://www.edsmh.univ-mrs.fr/>
Duration: 3 years (starting between September and November 2016)

CONTEXT

The focused attention is a high level of function for human to selectively facilitate certain actions and perceptions, as the perception of a risk of causing decision making in dangerous situations. However human is unable to indefinitely maintain a steady state of focused attention and generates errors. Recently, Derosière et al. (2015)¹ have demonstrated a commitment to motor-neuronal structures in response to disengagement prior cortical areas known to underlie the focused attention. Moreover, the lack of response to audible or visual alarms can be explained by an over-commitment of brain areas of attention, preventing attention to deploy to critical information (Dehais et al., 2014)². These difficulties are also observed in crisis simulation in which participants are faced with decision-making processes in degraded conditions, in emergency situations, and in complex and uncertain environment (Lapierre et al., 2016)³. The detection of these deficits therefore seems essential and could be useful in a variety of civilian applications at risk. A first challenge is to have accurate and sensitive measure of attentional load to consider a support action at an appropriate time in hazardous situations or for therapeutic purposes (Ayaz et al., 2012)⁴. In this context, the neurofeedback approach consisting of real-time control task of certain features of human activity is promising to treat the engagement of the individual in risky situations. But its use is still limited. The development and use of neurofeedback devices and other brain machine interfaces are still restricted by the high variability of brain or other physiological signals between and within subjects. In this context, machine-learning methods have proved effective transfer (Dalhoumi et al. 2015)⁵.

Objectives of the thesis

The interdisciplinary project NEURENGAGE (behavioral neuroscience, neuropsychology, machine learning, learning transfer, risk management science) is based on three objectives:

- 1) Test the relevance of neurobehavioral measures to estimate the attentional state and sensorimotor performance in dynamic interaction situations, defined as a compromise between the demands of the task and available cognitive-motor resources.
- 2) Identify devices with a multi-area approach (biomedical, home automation, voice, indoor location, etc.) to observe and characterize the behavioral, cognitive and motivational process of individuals subject to decision making in situations of emergency.
- 3) Design and develop an interactive neurofeedback device controlled via a human-machine interface, robust against non-stationarity and variability of neurophysiological signals as a means of assistance.

¹ doi: 10.1093/cercor/bht206

² doi: 10.1177/0018720813510735

³ doi: 10.3303/CET1648147

⁴ doi: 10.1016/j.neuroimage.2011.06.023.

⁵ doi: 10.1007/978-3-319-26532-2_12

PROFILE RESEARCH AND SKILLS

Applicants must hold a Master's degree in human movement science, cognitive science or a related discipline.

We are looking for an open-minded student, coming from a human sciences background (cognitive sciences, human movement sciences) but having in any cases at least some technical skills (programming, signal and data processing) and a string interest in human-related questions (neurophysiology, human interaction) with an experimental approach. Experience with methods for monitoring the brain is appreciated. An ability to speak French is not mandatory.

APPLICATION

Deadline for application: at the latest **August 29th 2016**

Applicants should send a detailed Curriculum Vita, a Letter of application and one letter of Recommendation to:

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Note that following applications, an interview will take place in the week between Monday August 29th to Friday, September 2, 2016.